CLAIMS

We claim:

1. A ballistics calculator system for computing targeting information to hit a target, comprising a processor, said processor comprising: a ballistics computer program for analyzing information needed to accurately aim a firearm at a target using a target acquisition device with a reticle, said program using information regarding one or more of:

a) external conditions;

b) the firearm being used;

c) the projectile being used;

d) the target acquisition device and reticle being used;

e) the shooter;

f) the relation of the shooter and the target, wherein said target can be greater than 1000 yards from the shooter; and

g) the ballistics drag model and retardation coefficient being used.

2. The ballistics calculator system of claim 1, wherein said information regarding external conditions is selected from one or more of date, time, temperature, barometric pressure, relative humidity, target image resolution, wind-speed, wind direction, hemisphere, latitude, longitude and altitude.

3. The ballistics calculator system of claim 2, wherein at least some of said information regarding external conditions is input to the program using an automated measuring device operably linked to the said processor.

4. The ballistics calculator system of claim 1, wherein said information regarding the firearm being used is selected from one or more of the rate and direction of the barrel twist, barrel length, vibrational analysis, internal barrel caliber and internal barrel diameter.

5. The ballistics calculator system of claim 1, wherein said ballistics computer program includes automatic input of firearm information by selecting stored rate and direction of barrel twist, barrel length, vibrational analysis, internal barrel caliber, and internal barrel diameter.

6. The ballistics calculator system of claim 1, wherein said information regarding the projectile being used is selected from one or more of projectile weight, projectile caliber, projectile configuration, propellant type, propellant amount, propellant potential force, powder, primer, one or more ballistic coefficients of the projectile, and the muzzle velocity of the projectile.

7. The ballistics calculator system of claim 6, wherein said ballistics computer program includes automatic input of projectile information by selecting stored projectile information.

8. The ballistics calculator system of claim 1, wherein said information regarding the target acquisition device and reticle being used is selected from one or more of type of reticle, power of magnification, plane of function, the positional relationship between the target acquisition device and the firearm, and the range at which the said target acquisition device was zeroed using said firearm and said projectile.

9. The ballistics calculator system of claim 1, wherein said information regarding the shooter is selected from one or more of the shooter's heart rate and rhythm, visual acuity, visual idiosyncrasies, respiratory rate, blood oxygen saturation, muscle activity, brain wave activity, and number and positional coordinates of spotters assisting the shooter.

10. The ballistics calculator system of claim 1, wherein said information regarding the relation between the shooter and target is selected from one or more of the distance between the shooter and target, the speed, acceleration and direction of movement of the target relative to the shooter, the angle formed between the barrel and an axis perpendicular to the force of gravity, and the direction of fire from true North.

11. The ballistics calculator system of claim 10, wherein said distance between the shooter and the target is less than 100 yards.

12. The ballistics calculator system of 10, wherein said distance between the shooter and target is greater than 100 yards.

13. The ballistics calculator of claim 10, wherein said distance between the shooter and target is greater than 500 yards.

14. The ballistics calculator of claim 10, wherein said distance between the shooter and target is greater than 1000 yards.

15. The ballistics calculator of claim 10, wherein said distance between the shooter and target is greater than 1500 yards.

16. The ballistics calculator of claim 1, wherein said information regarding the ballistics drag model and retardation coefficient being used is selected from one or more of G1, G5, G6, G7, GI, GS (Round ball), GL, RA, and custom drag models based upon the actual bullet being used, the Siacci analytical method of solution, numerical integration solutions using the drag models developed by Maievski, Ingalls, the Gavrês Commission, the British 1909 Commission, point-mass numerical integration using standard reference projectiles, point-mass numerical integration using the McDrag algorithm, modified point-mass models, and 6-Degrees-Of-Freedom (6DOF) models.

17. The ballistics calculator system of claim 1, wherein said reticle comprises an aiming point at an intersection of a primary vertical cross-hair and a primary horizontal cross-hair, wherein said ballistics calculator system further provides an output of the number of clicks an elevation knob and a windage knob should be turned to adjust a position of said target acquisition device relative to a firearm such that an intersection of said primary vertical cross-hair and said primary horizontal cross-hair can be used as the aiming point for striking said target.

18. The ballistics calculator system of claim 1, wherein said processor is further configured to display information on a display screen.

19. The ballistics calculator system of claim 18, wherein the information displayed is an image of a reticle on said display screen showing a position of said aiming point.

20. The ballistics calculator system of claim 18, wherein the information displayed is a projected image on a reticle showing a position of said aiming point.

21. The ballistics calculator system of claim 18, wherein the information displayed is a virtual image on a reticle showing a position of said aiming point.

22. The ballistics calculator system of claim 1, wherein said target acquisition device being used comprises:

a) a reticle, comprising:

1) a primary vertical cross-hair and a primary horizontal cross-hair;

2) a plurality of secondary horizontal cross-hairs at a predetermined distance along said primary vertical cross-hair;

3) a plurality of secondary vertical cross-hairs at a predetermined distance along at least some of said secondary horizontal cross-hairs; and

b) an output using said horizontal cross-hairs and said secondary vertical cross-hairs to identify an aiming point for hitting the target.

23. The reticle of claim 22, wherein the said primary vertical and horizontal cross-hairs intersect at the optical center of the said reticle.

24. The reticle of claim 22, wherein the said primary vertical and horizontal cross-hairs intersect above the optical center of the said reticle.

25. The reticle of claim 22, wherein the said primary vertical and horizontal cross-hairs intersect below the optical center of said reticle.

26. The reticle of claim 22, wherein at least some of said secondary horizontal cross-hairs are evenly spaced.

27. The reticle of claim 22, wherein at least some of said secondary vertical cross-hairs are evenly spaced.

28. The reticle of claim 22, wherein at least some of said secondary horizontal and vertical cross-hairs have identifying marks.

29. The reticle of claim 22, wherein said vertical and horizontal cross-hairs are connected to form a grid.

30. The reticle of claim 22, wherein said reticle includes range finding markings on said reticle.

31. The ballistics calculator system of claim 1, wherein said reticle being used comprises:

a) a plurality of primary cross-hairs separated by predetermined distances;

b) a plurality of secondary cross-hairs at predetermined distances along said plurality of primary cross-hairs; and

c) a plurality of lead markings indicating rate of movement of the target along at least one said cross-hair.

32. The reticle of claim 31, wherein said plurality of primary-cross hairs comprises vertical cross-hairs.

33. The reticle of Claim 31, wherein said plurality of primary cross-hairs comprises horizontal cross-hairs.

34 The reticle of Claim 31, wherein said plurality of primary cross-hairs comprises both vertical and horizontal cross-hairs.

35. The reticle of Claim 31, wherein said plurality of secondary cross-hairs comprises vertical cross-hairs.

36. The reticle of Claim 31, wherein said plurality of secondary cross-hairs comprises horizontal cross-hairs.

37. The reticle of Claim 31, wherein said plurality of secondary cross-hairs comprises both vertical and horizontal cross-hairs.

38. The reticle of Claim 31, wherein said plurality of secondary cross-hairs comprises at least three secondary cross-hairs.

39. The reticle of Claim 31, wherein said lead markings are on at least one of said primary cross-hairs.

40. The reticle of Claim 31, wherein said lead markings are on at least one of said secondary cross-hairs.

41. The reticle of Claim 31, wherein said lead markings are on at least one said primary cross hair, and at least one said secondary cross-hair.

42. The reticle of Claim 31, wherein said plurality of lead markings comprises at least three lead markings.

43. The reticle of Claim 31, wherein said lead markings are secondary cross-hairs.

44. The reticle of Claim 43, wherein at least one said cross hair is a line.

45. The reticle of Claim 44, wherein said line is an uninterrupted line.

46. The reticle of Claim 44, wherein said line is a straight line.

47. The reticle of Claim 46, wherein said straight line is an uninterrupted straight line.

48. The reticle of Claim 44, wherein said line is a predetermined thickness.

49. The reticle of claim 48, wherein said predetermined thickness is a single thickness along said cross hair.

50. The reticle of Claim 31, wherein said primary cross-hairs are evenly spaced.

51. The reticle of Claim 31, wherein said secondary cross-hairs are evenly spaced.

52. The reticle of Claim 31, wherein said lead markings are evenly spaced.

53. The reticle of Claim 31, further comprising a substantially transparent disc having an optical center and an edge for mounting said disc, and a ring positioned optically between said optical center and said edge, said ring spaced from said edge and circumscribing said optical center and one or more aiming points, whereby said ring can be visually centered in a field of view for aiding users in aligning their line of sight through said target acquisition device.

54. The reticle of Claim 31, further comprising rangefinder markings.

55. The reticle of Claim 31, further comprising markings for identification of one or more of said cross-hairs.

56. The reticle of Claim 31, further comprising markings for identification of one or more of said lead markings.

57. The reticle of Claim 31, further comprising an aiming dot.

58. The reticle of Claim 31, configured for use in day light illumination.

59. The reticle of Claim 31, configured for use in low light illumination.

60. The ballistics calculator system of claim 1, wherein said type of target acquisition device being used comprises:

a) a housing;

b) a means for mounting the housing in a fixed, predetermined position relative to a firearm;

c) an objective lens mounted in one end of the housing;

d) an ocular lens mounted in the opposite end of the housing; and

e) a reticle, comprising:

1) a primary vertical cross-hair and a primary horizontal cross-hair;

2) a plurality of secondary horizontal cross-hairs at a predetermined distance along said primary vertical cross-hair; and

3) a plurality of secondary vertical cross-hairs at a predetermined distance along at least some of said secondary horizontal cross-hairs.

61. The target acquisition device of claim 60, further comprising variable power optics permitting a user to select the optical power of said target acquisition device within a predetermined range.

62. The target acquisition device of Claim 60, wherein said variable power optics operate in the first focal plane.

63. The target acquisition device of Claim 60, wherein said variable power optics operate in the second focal plane.

64. The ballistics calculator system of claim 1, wherein said type of target acquisition device comprises:

a) a housing;

c) a means for mounting the housing in a fixed, predetermined position relative to a firearm;

c) an objective lens mounted in one end of the housing;

d) an ocular lens mounted in the opposite end of the housing; and

e) a reticle, comprising:

1) a plurality of primary cross-hairs separated by predetermined distances;

2) a plurality of secondary cross-hairs at predetermined distances along said plurality of primary cross-hairs; and

3) a plurality of lead markings indicating rate of movement of the target along at least one said cross-hair.

65. The target acquisition device of claim 64, further comprising variable power optics permitting a user to select the optical power of said target acquisition device within a predetermined range.

66. The target acquisition device of Claim 64, wherein said variable power optics operate in the first focal plane.

67. The target acquisition device of Claim 64, wherein said variable power optics operate in the second focal plane.

68. A method for using a ballistics calculator system, comprising:

a) providing the ballistics calculator system of claim 1;

b) inputting information regarding one or more of external conditions, the firearm being used, the projectile being used, the target acquisition device and reticle being used, the shooter, the relation of the shooter to the target, and the ballistics drag model and retardation coefficient being used;

c) selecting one or more aiming points on said ballistics calculator system; and

d) using the aiming point information displayed by the said ballistics calculator system to aim the firearm so as to hit the target.

69. A method for shooting a target, comprising:

a) A target acquisition device, comprising:

1) a housing;

2) a means for mounting the housing in a fixed, predetermined position relative to a firearm;

3) an objective lens mounted in one end of the housing;

4) an ocular lens mounted in the opposite end of the housing;

5) a reticle, comprising:

i. a primary vertical cross-hair and a primary horizontal cross-hair;

ii. a plurality of secondary horizontal cross-hairs at a predetermined distance along said primary vertical cross-hair;

iii. a plurality of secondary vertical cross-hairs at a predetermined distance along at least some of said secondary horizontal cross-hairs;

b) the ballistics calculator system of claim 1;

c) selecting an aiming point on said target acquisition device that account

for the relation of the shooter to the target; and

d) using the aiming point information displayed by the said ballistics calculator system to aim the firearm so as to hit the target.

70. A method for shooting a target, comprising:

a) a target acquisition device, comprising:

1) a housing;

2) a means for mounting said housing in a fixed, predetermined position relative to a firearm;

3) an objective lens mounted in one end of said housing;

4) an ocular lens mounted in the opposite end of said housing;

5) a reticle, comprising:

i) a plurality of primary cross-hairs separated by predetermined distances;

ii) a plurality of secondary cross-hairs at predetermined distances along said plurality of primary cross-hairs;

ii) a plurality of lead markings indicating rate of movement of the target along at least one said cross-hair;

b) the ballistics calculator of aim 1;

c) selecting an aiming point on said target acquisition device that accounts for the relation of the shooter to the target; and

d) using said targeting information displayed by said ballistics calculator system to aim said firearm so as to hit said target.

71. The method for shooting a target of Claim 70, wherein said target is hit by tracking said target with said aiming point.

72. The method of shooting a target of Claim 70, wherein said ballistics calculator system projects a reticle specific for information regarding one or more of:

a) the firearm being used;

b) the projectile being used; and

c) the target acquisition device being used.